REMARKS

Claim Status

Claims 1-24 were originally presented for examination in this application. In a preliminary amendment filed on May 14, 2004, Applicants added new claims 25-31. A restriction requirement issued on April 25, 2007, and Applicants elected claims 1-21 and 25-31 in response thereto. An office action issued on August 24, 2007, in which all pending claims were rejected, and an amendment and response was filed in which certain claim amendments were presented to overcome the rejects. A final office action issued on April 14, 2008, upholding the rejections, and a subsequent response was filed on May 29, 2008. A subsequent office action issued on July 11, 2008, again rejecting all pending claims, and a response was filed on November 4, 2008. An office action was then issued on January 26, 2009, in which the claims were again rejected, and a response was filed on May 20, 2009. A final office action issued on August 21, 2009, again rejecting the claims, and a response and request for continued examination was filed on December 3, 2009. A new office action issued on January 13, 2010, and in response Applicants amended claims 1, 15, and 17-21. A final office action has now issued in which:

- Claims 1-2, 4-9, 12-13, 15-16, 19, 25-26 and 29 were rejected under 35 U.S.C. §103(a) as being obvious in light of a paper by Olson et al. entitled "Moving Object Detection and Event Recognition Algorithms for Smart Cameras" ("Olson") in view of U.S. Patent No. 6,570,608 to Tserng ("Tserng") and in further view of U.S. Patent No. 6,798,897 to Rosenberg ("Rosenberg").

- Claims 10, 11, 17, 18, 20, 27, 28 and 30 were rejected under 35 U.S.C. §103(a) as being obvious in light of Olson, Tserng, Rosenberg and further in view of U.S. Patent No. 6,371,805 to Brodsky et al. ("Brodsky").

- Claims 14, 21 and 31 were rejected under 35 U.S.C. §103(a) as being obvious in light of Olson, Tserng and Rosenberg and further in view of U.S. Patent No. 6,441,846 to Carlbom et al. ("Carlbom").

In this response, Applicants have amended claims 1, 4, 5, 7, 15, and 17-21 to address these rejections and added new claims 32 and 33. No new matter has been added.

Claim Rejections Under 35 U.S.C. §103(a)

Independent claims 1, 15 and 19

Independent claims 1, 15 and 19 each recite using video frames generated by a plurality of image sensors to predict in which image region of a video frame in which an object will appear based on its location in a first video frame with respect to a monitored environment as it traverses the environment in a manner that is independent of calibration among the image sensors and the monitored environment. Critically, the tracking of the objects as they "move among fields-of-view" is also based on a transition probability table in which a first axis of the table represents a first set of image regions within the first video frame at a first point in time, and a second axis represents a second set of image regions within a second video frame generated by a second image sensor a second point in time. Each entry in the table represents the likelihood that an object included in a image region within the first video frame at the first time corresponds to the same object included in the second video frame at a second time.

In the most recent Office action, the Examiner cited the "probability matrices" of Rosenberg in rejecting claim 1. These matrices do not represent the probabilities that an object will appear in a different video frame generated by a different image sensor after being identified by a first sensor in a first frame, as claimed. In fact, Rosenberg's technique has nothing to do with identifying objects across multiple fields of view – it is used to register two images by identifying common elements of the two images.[1] In one step of the registration process, motion is detected within a scene using time-separated images of the scene. The "probability matrix" is used to store "the probability of a possible displacement between the individual location in the first image … and its corresponding location within a second image."[2] Effectively, the values in the matrix represent "a probability or likelihood for any possible displacement of a point."[3] A pure probability (typically represented by a numeric value between 0 and 1) as described in one embodiment of the claimed invention (see, for example, Fig. 7B of the instant application) is far

[1] Rosenberg, Abstract.
[2] Rosenberg, column 3, lines 48-50.
[3] Rosenberg, column 13 lines 1-2.

different that a distance value calculated using the Rosenberg approach, as evidenced by the use of coordinate mathematics.[4] Rosenberg then goes on to describe numerous methods that may be used to calculate the probabilities that a pixel has shifted by such a distance, but at no time does he even suggest that they represent a likelihood that an object will appear in another field of view as recorded by a second image sensor.

In contrast, the claims recite tracking objects among multiple cameras using probabilities that represent the likelihood an object will appear within a video frame generated by another camera after the object (or objects) have been captured by a first camera at a future time as the object moves among different fields of view. By way of example, consider a person leaving a room in which a surveillance camera has been installed and having two exits, each exit leading into separate hallways, in which additional cameras have been installed. Further, one of the exits is a door into an often-used hallway, whereas the other door leads to a rarely-used fire escape.

In this manner, the system determines, by tracking objects over time, that the probability a person exited the room into the hallway is 95%, and into the fire escape is 5%, for example. Therefore, when the individual leaves the field-of-view of the room camera, the system can "guess" (correctly, in most instances) that the next camera on which they will appear is the hallway camera, even if, as may the case in certain situations, the fields-of-view of the two cameras do not overlap. Such information may be used, for example, to provide selected video feeds to surveillance personnel, or initiate recordings of activities based on a likely event or movements without having to monitor or activate numerous cameras. Rosenberg's system, even when combined with Olson and Tserng, cannot perform this analysis. While Rosenberg's probability matrices may be able to quantify how far a particular pixel may have shifted from one frame to another when captured by the same sensor, its application is limited to the registration of the two images, not tracking an object across multiple fields of view over time, as claimed.

[4] See, for example, the calculation of a displacement expressed as a function of coordinate points u and v starting at column 13, line 42.

Independent claims 17, 18 and 20

Independent claims 17 and 20 recite applying the monitoring and tracking techniques of claims 1 and 15 in a particular environments but still include the distinguishing limitations of claims 1 and 15 described above. The Examiner has cited Brodsky for the limited purpose of illustrating that surveillance may be performed in parking lots, and as such, Brodsky does not cure the deficiencies of Rosenberg.

Independent claim 21

Independent claim 21 recites applying the monitoring and tracking techniques of claims 1 and 15 in a particular environment but still includes the distinguishing limitations of claims 1 and 15 described above. The Examiner has cited Carlbom for the limited purpose of illustrating that surveillance may be performed retail establishments, and as such, Carlbom does not cure the deficiencies of Rosenberg.

Thus, because none of the cited references, taken either alone or in any combination, teach or suggest every element of independent claims 1, 15, 17, 18, 19, 20 and 21, Applicants respectfully submit that these references fail to anticipate or render these claims obvious. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1, 15, 17, 18, 19, 20 and 21 under 35 U.S.C. §103(a), as well as those claims that depend directly or indirectly therefrom.

CONCLUSION

Applicants respectfully requests allowance of claims 1, 2, 4-21 and 25-33 in due course. The Examiner is invited to contact Applicants' undersigned representative by telephone at the number listed below to discuss any outstanding issues.

Respectfully submitted,

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